$$P_{out} = [P_{22}(T_2, B_2) - P_{11}(T_1, B_1)]\sqrt{\frac{(T_n - T_1)^2 + (B_m - B_1)^2}{(T_2 - T_1)^2 + (B_2 - B_1)^2}} + P_{11}(T_1, B_1) \quad (5)$$

where:

P_{out} is the interpolated output value from equation (5);

P_{11} (T_1, B_1) is the ROM stored pressure value for a temperature of T_1 and a pressure indicator of B_1;

P_{22} (T_2, B_2) is the ROM stored pressure value for a temperature of T_2 and a pressure indicator of B_2;

T_n is the measured temperature, $T_1 < T_n < T_2$; and

B_m is the measured pressure indicator $B_1 < B_m < B_2$.

Microprocessor **705** then converts the interpolated pressure output value P_{out} into the form required for display **707** and display **707** indicates the pressure measured by pressure sensor **100**.

As described above, the temperature sensitive resistor element is disposed on the same semiconductor chip and is in close physical proximity to the piezoresistive elements. In addition, in the first and second disclosed methods for producing the structure of this invention, the temperature sensitive resistor is a part of the same single crystal silicon structure as the piezoresistive resistor elements. Therefore, the temperature measured by the temperature sensitive resistor is the same as the temperature at the piezoresistive elements. Using the temperature measured by the temperature sensitive resistor, it is possible to correct the electrical measure of the pressure provided by one or more piezoresistive elements and thereby provide a more accurate measure of the actual pressure.

What is claimed is:

1. A thermally compensated silicon pressure sensor comprising:

(a) a single crystal of silicon including:

(1) a diaphragm portion with a top surface and a bottom surface, having a thickness permitting flexure when a pressure differential is applied between said top surface and said bottom surface and having a continuous loop resistor element disposed adjacent to said top surface in a position for exhibiting piezoresistivity when said diaphragm is flexed, a first resistor disposed in a central portion of said diaphragm portion, a second resistor connected to said first resistor and disposed in a peripheral portion of said diaphragm portion, a third resistor connected to said second resistor and disposed in a central portion of said diaphragm portion and a fourth resistor connected to said first and third resistors and disposed in a peripheral portion of said diaphragm portion; and

(2) a clamp ring portion disposed around the entire perimeter of said diaphragm portion having a thickness providing mechanical support to said diaphragm portion and permitting virtually no flexure of said clamp ring portion when a pressure differential is applied between said top surface and said bottom surface of said diaphragm portion, and further having a temperature sensitive resistor disposed therein;

(b) a first set of electrical terminals including a first electrical terminal disposed in ohmic contact with said continuous loop resistor element at the connection between said first and second resistors, a second electrical terminal in ohmic contact with said continuous loop resistor element at the connection between said second and third resistors, a third electrical terminal in ohmic contact with said continuous loop resistor element at the connection between said third and fourth resistors and a fourth electrical terminal disposed in ohmic contact with said continuous loop resistor element at the connection between said first and fourth resistors; and

(c) a second set of electrical terminals disposed in ohmic contact with said temperature sensitive resistor.

2. A thermally compensated silicon pressure sensor as claimed in claim **1**, wherein:

said temperature sensitive element comprises a resistor region adjacent to a surface of said clamp ring portion having a conductivity type opposite to the conductivity type of the surrounding clamp ring portion; and

said second set of electrical terminals comprises a fifth electrical terminal and a sixth electrical terminal disposed in ohmic contact with said resistor region.

3. A thermally compensated silicon pressure sensor as claimed in claim **1**, wherein:

said second set of electrical terminals comprises a fifth electrical terminal including at least one spreading-resistance thin-film metal contact to said clamp ring portion and a sixth electrical terminal including at least one spreading-resistance thin-film metal contact to said clamp ring portion; and

said temperature sensitive element comprises the bulk resistance of said clamp ring portion between said fifth and sixth electrical terminals.

4. A thermally compensated silicon pressure sensor as claimed in claim **1**, further comprising:

a sensor package connected to said clamp ring portion having a first port for applying a first pressure to said top surface of said diaphragm portion and a second port for applying a second pressure to said bottom surface of said diaphragm portion.

5. A thermally compensated silicon pressure sensor as claimed in claim **1**, further comprising:

a sensor package connected to said clamp ring portion having a chamber enclosing one of said surfaces of said diaphragm portion at a fixed pressure and a port for applying a pressure to the other of said surfaces of said diaphragm portion.

6. A thermally compensated silicon pressure sensor comprising:

a silicon carbide diaphragm having a top surface and a bottom surface and a thickness permitting flexure when a pressure differential is applied between said top surface and said bottom surface;

at least one doped silicon resistor element disposed on said top surface of said diaphragm in a position for exhibiting piezoresistivity when said diaphragm is flexed;

a polycrystalline silicon clamp ring disposed on the peripheral portion of the bottom surface of said diaphragm around the entire perimeter of said diaphragm having a thickness providing mechanical support to said diaphragm and permitting virtually no flexure of said clamp ring when a pressure differential is applied between said top surface and said bottom surface of said diaphragm; and